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(54) Child's training pants and process of manufacture.

(57) The training pant (10) is generally made in a 2-step process which provides a substantially flat 2-dimensional backsheet (30) carrying waist elastics (38, 39), a fluid barrier (41) and an absorbent core (43). The second section provides a generally flat, 2-dimensional topsheet (45), which carries leg elastics (51, 52) and frontal elastics (53, 54) and which is combined with and which overlies the aforementioned backsheet (30). Subsequent half-folding of the assembled webs (30, 45) produces a U-shaped member (64) which, when cut, assembled and severed, provides discrete individual training pants (10), each having a unique frontal elastic to provide a better fit of the garment between a front waist elastic (39) and front terminal edges of the leg elastic (51, 52). The product (10) is further characterized in that both the backsheet (30) and the topsheet (45) may be of breathable pervious material, with the only impervious portion being a coating (41) between the absorbent core (43) and the backsheet (30).

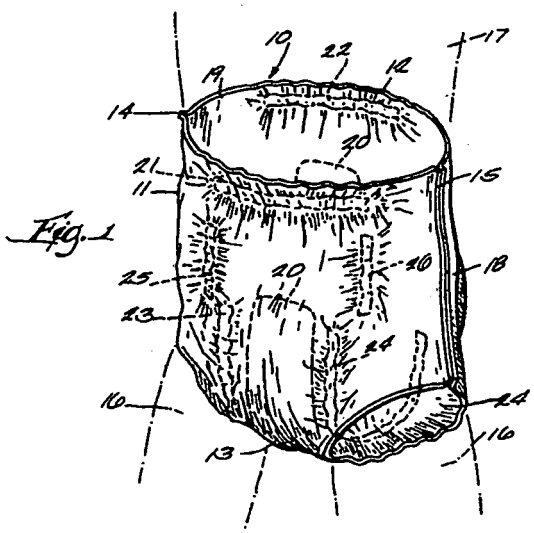

Fig. 1

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This invention relates to a child's training pants and a process of manufacturing the same.

The disposable baby diaper business is of tremendous proportions, accounting for annual sales of more than 16 billion units for a value in excess of $4,000,000,000.

Such products are usually the one-piece shaped elastic leg system popular in the United States or, in many cases, the two-piece (Swedish) system preferred by many in Europe.

Such products are primarily for use on infants from birth to two years of age, by which time most of the children are "toilet trained" and no longer need a disposable diaper.

However, it has been recently recognized that a substantial number of children who have "grown out of diapers" and are assumed to be "toilet trained" have not reached that stage of development, and a substantial demand exists for an intermediate garment which has popularly been called the "training pant".

It is important from a psychological standpoint that this product be different from "baby diapers", because the child who is being toilet trained no longer believes he or she is a baby and has grown up to become a "big kid".

Thus it is desirable that the product appear to be more like the adults' underwear and, even more preferably, of the "jockey" or shorts-type rather than the open, loose-leg or "Bermuda shorts" type.

In any event, the product should be cosmetically acceptable and constructed in such a way that it is not bulky and yet fits properly and is easy to put on and take off.

Products of this type have been the subject of prior art disclosures shown particularly in U.S. Patents 4,646,362; 4,743,239; 4,906,243 and 4,909,804; as well as in European Patent Specifications 0320991 and 0320989.

Because the prior art fails to provide the attractive cosmetic, functionally-effective results desired, it is a specific object of the present invention to provide a highly attractive training pant for children who have grown out df diapers but are not yet toilet trained, to provide a more effective containment device for body exudates when worn by incontinent persons such as children who have not yet been toilet trained or adults who are subject to adult incontinence problems, to provide a superior, efficient and economically-functional process for the production of a training pant at high speeds on equipment similar to that which has been known in the art to produce baby diapers, and which process will enable the product to be sold at a low price which justifies its disposability after one wearing.

This object is obtained with a training pant for adolescent children and incontinent adults, said pant having a front waist portion with a frontal end, a rear waist portion with a rear end, a crotch portion, side portions and leg openings in said side portions adjacent said crotch portion, a backsheet, a porous topsheet, an absorbent core having a major and a minor dimension and disposed between the topsheet and the backsheet and between the leg openings, a barrier material disposed between the core and the backsheet, at least one leg elastic member between each major dimension of the absorbent core and its adjacent leg opening, one end of each of said leg elastic members terminating in the front waist portion, a pair of frontal elastic tapes in the front waist portion, at least a portion of which tapes lie above the terminal ends of the leg elastic members.

Preferably the frontal elastic tapes are separated laterally a distance greater than the distance between the leg elastic members.

It is advantageous that the tension in the frontal elastic tapes is different from the tension in the leg elastic members.

The training pant may include at least one waist elastic member in the front waist portion between the frontal elastic tapes and the frontal end of the pant.

The training pant may also include a waist elastic member in the rear waist portion above the terminal ends of the leg elastic members and the rear end of the pant. Preferably the absorbent core is rectangular. Conveniently the backsheet is a porous material. The porous backsheet and the porous topsheet may both be formed of hydroentangled nonwoven webs. Preferably the backsheet is a cotton material. The leg elastic members should be between 30 and 35 cm (12 and 14 inches) long. The frontal elastic members should be between 10 and 18 cm (4 and 7 inches) long. Usually the leg elastic members are 25 cm (10 inches) long and the frontal elastic members are 15 cm (6 inches) long. Preferably the absorbent core is 9 cm (3.5 inches) wide and 45 cm (17.5 inches) long. It is convenient that the absorbent core is a combination of superabsorbent material, cellulose pulp and thermally-bondable fibers. Preferably the elastic members are a heat shrinkable thermal-elastic material. The backsheet and the topsheet can be made of a polyester spunlace material.

A clear hot-melt adhesive material can be used as a barrier material. The said object is further obtained by a process for providing a disposable training pant for adolescent children which comprises: providing a web of backing material, moving said web along an assembly machine, applying discreet sections of adhesive on said web, depositing a waist elastic member on each of said sections of adhesive, applying a discreet area of barrier material to said web of backing material, providing a web of absorbent core material, separating

said core web into sections, depositing a section of said core material upon the aforementioned barrier material, providing a second web of pervious coverstock material, applying discreet sections of adhesive material transversely on said second web to define at least a pair of leg elastic securement areas and a pair of frontal elastic securement areas, providing a plurality of leg elastic members and a plurality of frontal elastic members, depositing said leg elastic members and said frontal elastic members upon the adhesive in the respective securement areas, inverting said second web and moving it onto the web of pervious backing material, in alignment therewith, and in synchronism therewith, so that the aforementioned leg and frontal elastic members are disposed one on each side of the section of core material, bonding said webs together, folding said bonded webs longitudinally in half and aligning the opposed edges thereof, removing a section of the bonded webs along the fold line, and cutting said webs along a line transversely of said webs at the middle of said removed section and sealing the webs on each side of said cutting line to provide individual training pants.

Preferably said elastic members are made of heat activatible plastic material which is flat and non-elastic when applied to the respective webs.

It is convenient to pass said individual garments through a heating chamber so as to activate the heat-activatable elastic.

Advantageously, the adhesive material is a hot-melt adhesive.

The bonding of the two webs can be accomplished by using a hot-melt material or by mechanically crimping the two webs together, or by an ultrasonic means, or by sewing.

Preferably the cutting and sealing of the folded webs are accomplished simultaneously.

It is convenient that the heating chamber is at a temperature of 80 and 100°C (180° and 210° F) and the residence time of the pants in the chamber is between 8 to 12 seconds.

Preferably the temperature of the heating chamber is 93°C (200° F) and the residence time of the pants in the chamber is 10 seconds.

So in the present invention, a disposable training pant is provided which may have a breathable, cloth-like backing sheet or outcover, impervious in the fluid-contacting area, a cloth-like, pervious body-contacting topsheet or inner cover, with a highly integrated absorbent pad disposed between the two cover materials.

In addition to the absorbent matt or core, the garment also includes a leg elasticating mechanism, a waist elasticating mechanism, and a frontal elasticating mechanism to provide a comfortable, form-fitting garment, which is easily drawn over the legs and around the body by a youngster without the need for application of the garment to the body of the youngster by a parent or a care-giver. When worn, the garment gives every appearance of being very similar to universally-acceptable types of underwear, while yet providing protection against accidental discharges which occur during the "toilet training" period.

The process for producing the garment of the present invention is a relatively uncomplicated straight-line process which, in one aspect includes unwinding a breathable pervious backing sheet, onto which are applied the necessary adhesives, waist elastics, fluid barrier, and absorbent core.

A second portion of the apparatus and process includes the unwinding of a pervious nonwoven coverstock material, to which are applied the adhesives and the elastic mechanisms for the leg elastics and the frontal elastics.

In both of the unwind and accumulating operations, the lengthwise direction of the diaper is disposed cross-machine or at right angles to the flow of the material as the various elements are accumulated.

Subsequently, the coverstock with its assembled elastic members is laid down upon the backing strip with its assembled members to combine the product. Thereafter the assembled webs are folded longitudinally in half and portions thereof joined together at spaced intervals and portions removed also at spaced intervals to provide individual and discreet training pants.

The so-separated garments pass through a heating chamber where the elastic members are activated to provide the finished product and, from there, pass on to a packaging assembly process.

The invention is further illustrated by means of the accompanying drawings in which Figure 1 is a perspective view of the training pant of the present invention as it would appear when worn by a child,

Figure 2 is a schematic flow chart of the assembly of the various component parts of the training pant to provide the finished product,

Figures 3a and 3B illustrate the disposition of the elements on the backing sheet at various stages during the process,

Figures 4a and 4b illustrate the nonwoven coverstock with its various assembled components at separate stages of the assembly process, and

Figure 5 is a diagramatic conceptual view of one of the training pants when laid flat, prior to folding the pant in half, and prior to attaching the sides and prior to heat-shrinking the elastic members.

Referring now to Figure 1, there is shown a garment or training pant 10, as it would appear and worn by a child, disposed around the torso (i.e., the waist) and above the legs of the child. The garment includes a front portion 11 and a back portion 12

connected by a crotch portion 13. The front portion 11 and the back portion 12 are joined together along side flanges 14 and 15 respectively to provide a unitary undergarment which is drawn up upon the body over the legs 16 to the waist 17 of the infant.

The garment includes an outer cover 18 and an inner pervious body-contacting liner 19 with an absorbent pad 20 disposed between the two materials and arranged to lie in the crotch portion of the pant around the genitalia of the infant. As designed, this product is equally effective for female children as well as male children.

The garment also may include a front waist elasticating member 21 and a back waist elasticating member 22, as well as a pair of leg elasticating members 23 and 24.

Unique to the garment of the present invention is a pair of frontal elastics 25 and 26.

it is well-known in prior art to have waist elastics in disposable diapers (similar to the waist elastics 21 and 22 of the present invention) and to have leg elasticating mechanisms such as the leg elasticating mechanism in 23 and 24 of the present invention. It is previously known in the art that these elasticating mechanisms may be provided from material which is non-elastic and flat when applied to the garment, that such elements may thereafter be elasticated by subjecting them to heat. Such heat-shrinkable materials are well known.

Nevertheless, the garment of the present invention, for the first time, provides a separate pair of frontal elastic members 25 and 26 in the front waist area, a major portion of which is disposed above the terminal portions of the leg elastics 23 and 24 and provides, for the first time, a garment which is uniquely cosmetically able to fit on children of different ages and different body dimension.

The construction of the garment of the present invention can be better understood by reference to Figure 2, which is a flow diagram depicting the assembly of the component parts of the garment.

In Figure 2, reference 30 refers to a backsheet material which may be a spun-lace or hydro-entangled web, all as is well-known in the art. The backsheet 30 unwinds from a roll 31 through a tension control mechanism 32 onto the horizontal bed of the assembly machine (not shown). The backsheet 30 may, if desired, be an impervious plastic film.

The arrow 33 indicates the direction of flow of material during the assembly process, generally described as being the "machine direction" of the flow process. The arrow 34 indicates the "cross-machine" direction.

The apparatus may include an automatic splice unwind device (not shown) so that at high speeds the transfer of the material 30 from one roll 31 to an auxiliary roll (not shown) may take place automatically and without stopping the machine.

A preferred form of the backsheet material 30 is 32 cm (13") wide polyester spun-lace (i.e., hydro-entangled) material which may be printed or have primary (i.e. bright) colors.

Shortly after the web 30 begins its horizontal movement, a pair of adhesive "guns" apply strips of hot melt adhesive 36 to the web 30 as by conventional spray-applicating systems.

While the adhesive 36 is still tacky, waist elastic members, unwound from supply rolls 37 are deposited in intermittent strips 38 and 39 onto the tacky adhesive 36.

A preferred material for waist elastic members is a heat-shrinkable elastic material.

Because one of the elastic members as, for instance, 38, will be at the front waist portion of the garment, and 39 will be at the back waist portion of the garment, these two members 38 and 39 may be different color elastic to help the user of the garment identify the front and back portions. This may be particularly effective and critical for a child two to three years of age, for whom color identification is meaningful, but for whom word identification is not. For instance, the back elastic 39 may be colored blue and the front elastic 38 may be clear.

As the web 30 moves along the processing machine, it flows beneath another adhesive applicator 40, which may be a conventional slot-coating device, and which applies a barrier material 41.

A preferred adhesive material 41 which is applied by the applicator 40 is a clear hot-melt material.

This barrier material is applied intermittently in a rectangular pattern in a strip 9 cm (3-1/2 inches) wide and 45 cm (17-1/2 inches) long and approximately 25 to 50 microns (1 to 2 mils) thick. The long dimension of the barrier material is in the cross-machine direction, and the distance between the trailing edge of one application area and the leading edge of the followng application area is preferably 25 cm (10 inches).

It is to be understood that the dimensions given for this area may vary, as, for instance, the length may be less than 45cm (17-1/2 inches) long but, in any event, the dimensions should be matched to the dimension of the absorbent core hereinafter to be described.

The area of the hot melt barrier material is indicated at 42 in the drawing.

Further downstream from the applicator 40, a roll of thermally-bonded absorbent core material 43 is unwound and cut into discreet portions which are applied directly as individual pieces 44 on top of

the barrier material 42.

This thermally-bonded core material rpeferably is a combination of superabsorbent material, cellulose fluff, and thermally-bondable fibers, and the pieces 44 are applied to the hot-melt barrier material 42 while the barrier material 42 is still "tacky", and thus the barrier material not only serves to provide an impervious section on the web 30 directly beneath the core 44, but also holds the core 44 in place on the web 30.

When the selected web material 30 is pervious (such as spun-lace or cotton material), it is important to provide an impervious area beneath the absorbent core, and this is accomplished by applying the hot melt barrier material directly between the web 30 and the absorbent core 44.

At this point, downstream from the just-applied core 44, the web of coverstock material 45 is brought onto the machine.

This web 45 started in a roll 46 "off-machine" (i.e., not in-line with the process and equipment which has just been described). The web 45 is of pervious material and is unwound from the roll 46, and is preferably a lightweight nonwoven material having good formation and tactile properties. This means that preferably it has a "soft hand". Several types of this nonwoven material are available, and it may be thermally-bonded polyester or polypropylene fibers, spun bonded polypropylene, or the like.

After the web 45 is unwound from the roll 46, a plurality of hot-melt spray applicators (not shown) apply discrete sections of hot-melt adhesive from conventional spray systems to provide the adhesive areas 47-50. Two of these areas 47 and 48 are designed to hold the leg elastics, while the other two shorter areas 49 and 50 will hold the frontal elastics.

Downstream in the movement of the web 45, after the application of the adhesive portions 47-50, a plurality of leg and frontal elastics 51-54 of the heat shrinkable material previously described, are unwound from dispensers 55 and laid upon the adhesive portions 47-50. Two of these elastics 51 and 52 provide the leg elasticating mechanism, while the other two, 53 and 54, provide the frontal elastication mechanism.

It is preferred that these last-mentioned elastic members 51-54 also be of the clear, heat-shrinkable material provided by Minnesota Mining & Manufacturing Company. They are applied with a cut-and-space module (not shown).

The two strands which form the leg elastics 51 and 52 are preferably 33 cm (13 inches) long and 1.3 cm (1/2 inches) wide, while the two strands which form the frontal elastic are preferably 15 cm (6 inches) long and 1.3 cm (1/2 inches) wide.

Thus the two longer strands 51 and 52 extend through the crotch portion 13 to both the frontal portion 11 and the back portion 12 to provide the leg elastics 23 and 24 shown in Figure 1.

After the application of the elastic members to the web 45, all of which has been taking place on the top of the web, the web approaches the machine and is turned around a turning bar 56 so as to overlie the backsheet 30 with the elastic members underneath the coverstock 45 and, therefore, between the coverstock and the backsheet.

Just prior to the assembly of the coverstock on the backsheet, as at the area 57, an adhesive applicator 58 applies conventional hot melt through a conventional spray system in an appropriate pattern so as to bond the webs 30 and 45 together with the aforementioned elastics and absorbent core disposed therebetween.

The combining of the two webs in the area 57 may be done by a pair of rollers 59, or, if it is preferred not to use a hot melt for this assembly process, the item 59 may be an ultrasonic bonding section or a mechanical crimping section.

Because the hot melt system is well-known and has been well-tested, such application is preferred, although the other technologies are to be considered as suitble alternatives.

After the two webs have been assembled, a folding pan 60 causes the edge 61 of the assembled web to fold over and on top of and aligned with the edge 62 to provide a U-shaped product with the fold line 63 hereinafter defining the bottom of the crotch of the training pant.

This bi-sectional fold 64 is followed by a cutting section (not shown) which removes a portion 65 at spaced intervals along the bi-folded edge 63. This cutting may be done by a rotary die or rotary knife and, as will be seen, provides a cut-out portion in two adjacent garments being formed in the bi-sectional fold. In the preferred embodiment of the design, the cut-out portion has a cross-machine direction of 10 cm (4 inches).

Thereafter, a cutting and sealing mechanism (not shown) severs the bi-sectionally folded garment along the lines 66, while at the same time crmping or sealing the multi-layer folds in the areas 67 and 68 directly adjacent on each side of the cut-line 66. This cutting action provides the side flanges 14 and 15 which completes the waist portions 18 and 19 shown in Figure 1.

After the individual garments have been divided by the severing action just described, the garments pass through a heat tunnel, which causes the heat-shrinkable elastics heretofore described to become activated, and to complete the manufacturing process. The preferred length of time as the garments pass through the heat tunnel is approximately 10 seconds at a temperature of 93°C (200° F), but obviously the speed and temperature can

change depending upon the preferred flow characteristics of the products through the assembly line.

After the garments have been completed, they can be packaged in substantially the same type of plastic bag packaging material well-known for the marketing of baby diapers. It is preferred that the packaging be of the compressed package type, so as to provide economies of space and materials.

It is clear, therefore, that we have provided a training garment which has many characteristics of previously known garments, but it should also be evident that the high-speed process of the present invention produces a unique garment because of the frontal elastics 25 and 26 which provide a better fit and a more cosmetic appearance to the finished garment.

Claims

1. In a training pant (10) for adolescent children and incontinent adults said pant having a front waist portion (11) with a frontal end, a rear waist portion (12) with a rear end, a crotch portion (13) side portions and leg openings in said side portions adjacent said crotch portion (13),
   - a backsheet (18, 30)
   - a porous topsheet (19, 45)
   - an absorbent core (20, 43, 44) having a major and a minor dimension and disposed between the topsheet (19, 45) and the bakcsheet (18, 30) and between the leg openings,
   - a barrier material (41, 42) disposed between the core (20, 43, 44) and the backsheet (18, 30),
   - at least one leg elastic member (23, 24, 51, 52) between each major dimension of the absorbent core (20, 43, 44) and its adjacent leg opening,
   - one end of each of said leg elastic members (23, 24, 51, 52) terminating in the front waist portion (11),
   - a pair of frontal elastic tapes (25, 26, 53, 54) in the front waist portion, at least a portion of which tapes lie above the terminal ends of the leg elastic members (23, 24, 51, 52).

2. The training pant of Claim 1 wherein the frontal elastic tapes (25, 26, 53, 54) are separated laterally a distance greater than the distance between the leg elastic members (23, 24, 51, 52).

3. The trainng pant of Claim 1 wherein the tension in the frontal elastic tapes (25, 26, 53, 54) is different from the tension in the leg elastic members (23, 24, 51, 52).

4. The training pant of Claim 1 including at least one waist elastic member (21, 39) in the front waist portion (11) between the frontal elastic tapes (25, 26, 53, 54) and the frontal end of the pant.

5. The training pant of Claim 1 including a waist elastic member (22, 38) in the rear waist portion (12) above the terminal ends of the leg elastic members (23, 24, 51, 52) and the rear end of the pant.

6. The training pant of Claim 1 wherein the absorbent core (20, 43, 44) is rectangular.

7. The training pant of Claim 1 wherein the backsheet (18, 30) is a porous material.

8. The training pant of Claim 1 wherein the porous backsheet (18, 30) and the porous topsheet (45) are both formed of hydro-entangled nonwoven webs.

9. The training pant of Claim 1 wherein the backsheet (18, 30) is a cotton material.

10. The training pant of Claim 1 wherein the leg elastic members (23, 24, 51, 52) are between 30 and 35 cm (12 and 14 inches) long.

11. The training pant of Claim 1 wherein the frontal elastic members (25, 26, 53, 54) are between 10 and 18 cm (4 and 7 inches) long.

12. The training pant of Claim 1 wherein the leg elastic members (23, 24, 51, 52) are 25 cm (10 inches) long and the frontal elastic members (25, 26, 53, 54) are 15 cm (6 inches long).

13. The training pant of Claim 1 wherein the absorbent core (20, 43, 44) is 9 cm (3.5 inches) wide and 45 cm (17.5 inches) long.

14. The training pant of Claim 1 wherein the absorbent core (20, 43, 44) is a combination of superabsorbent material, cellulose pulp and thermally-bondable fibers.

15. The training pant of Claim 1 wherein the elastic members (38, 39, 51 to 54) are a heat-shrinkable thermal-elastic material.

16. The training pant of Claim 1 wherein the backsheet (18, 30) and the topsheet (19, 45) are made of a polyester spunlace material.

17. The training pant of Claim 1 wherein the barrier material (41, 42) is a clear hot-melt adhesive material.

18. In a process for providing a disposable training pant (10) for adolescent children,
- providing a web (18,30) of backing material
- moving said web (18,30) along an assembly machine,
- applying discrete sections (36) of adhesive on said web (18,30),
- depositing a waist elastic member (38, 39) on each of said sections (36) of adhesive,
- applying a discrete area (42) of barrier material (41) to said web (18, 30) of backing material,
- providing a web (43) of absorbent core material,
- separating said core web (43) into sections (44),
- depositing a section (44) of said core web (43) upon the aforementioned barrier material (41),
- providing a second web (45) of pervious coverstock material,
- applying discrete sections (47 to 50) of adhesive material transversely on said second web (45) to define at least a pair of leg elastic securement areas (47, 48) and a pair of frontal elastic securement areas (49, 50)
- providing a plurality of leg elastic members (51, 52) and a plurality of frontal elastic members (53, 54),
- depositing said leg elastic members (51, 52) and said frontal elastic members (53, 54) upon the adhesive in the respective securement areas (47 to 50),
- inverting said second web (45) and moving it onto the web (18, 30) of pervious backing material, in alignment therewith, and in synchronism therewith, so that the aforementioned leg and frontal elastic members (51 to 54) are disposed one on each side of the section (44) of core material (43),
- bonding said webs (30, 45) together,
- folding said bonded webs (30, 45, 64) longitudinally in half and aligning the opposed edges (61, 62) thereof,
- removing a section (65) of the bonded webs (20, 45, 64) along the fold line (63), and
- cutting said webs (30, 45, 64) along a line (66) transversely of said webs (30, 45, 64) at the middle of said removed section (65) and sealing the webs (30, 45, 64) on each side (67, 68) of said cutting line (66) to provide individual training pants (10).

19. The process of Claim 18 wherein said elastic members (38, 39, 51 to 54) are made of heat activatible plastic material which is flat and non-elastic when applied to the respective webs (30, 45).

20. The process of Claim 19 including passing said individual garments (10) through a heating chamber so as to activate the heat-activatable elastic.

21. The process of Claim 18 wherein the adhesive material (36, 47 to 50) is a hot-melt adhesive.

22. The process of Claim 18 wherein the bonding of the two webs (30, 45) is accomplished by using a hot-melt material, by mechanically crimping the two webs together, by an ultrasonic means, or by sewing.

23. The process of Claim 18 wherein the cutting and sealing of the folded webs (30, 45) is accomplished simultaneously.

24. The process of Claim 20 wherein the heating chamber is at a temperature of between 80 and 100°C (180° and 210° F) and the residence time of the pants in the chamber is between 8 to 12 seconds.

25. The process of Claim 20 wherein the temperature of the heating chamber is 93° C (200° F) and the residence time of the pants in the chamber is 10 seconds.

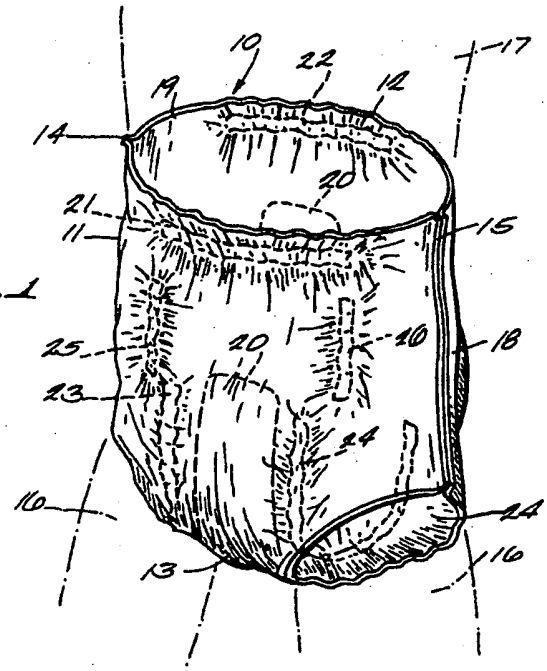

Fig. 1

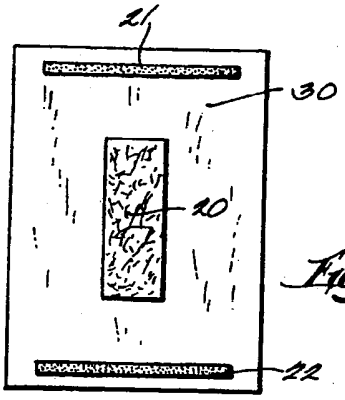

Fig. 3a

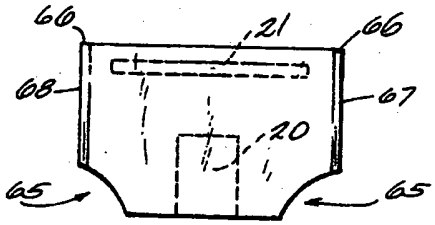

Fig. 3b

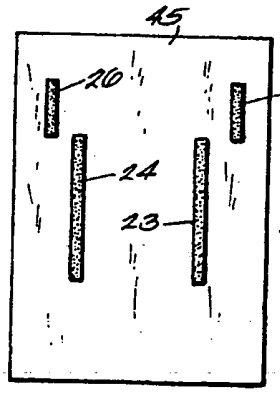

Fig. 4a

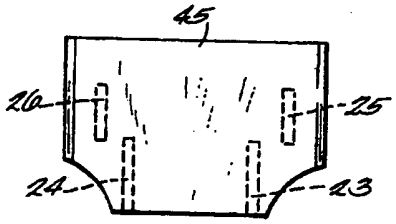

Fig. 4b

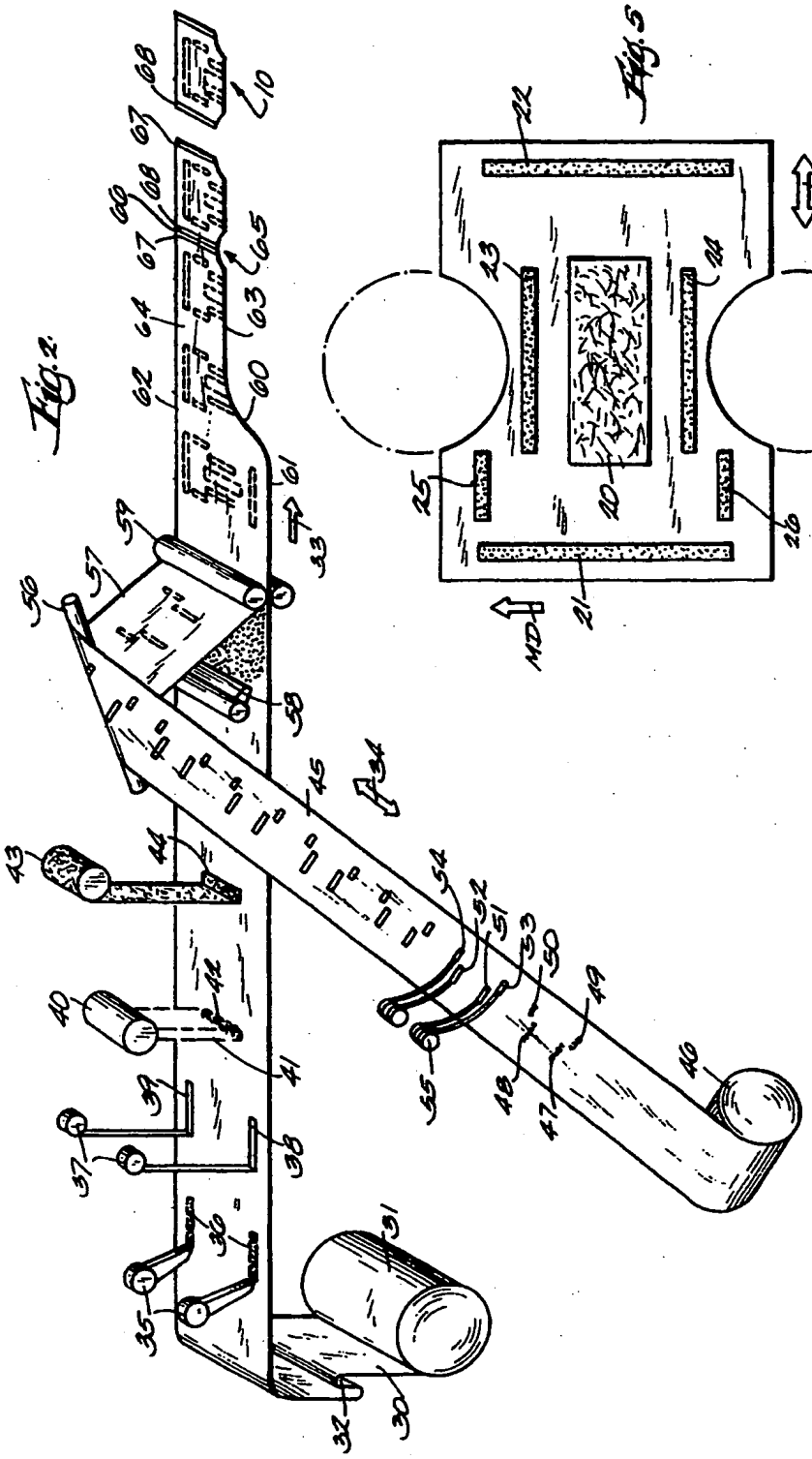

Fig. 2

Fig. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 11 9775

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,X,A	EP-A-0 320 991 (KIMBERLY-CLARK) * column 2, lines 31 - 42;column 4, lines 8 - 15 and 32 - 36; column 7, lines 16 - 56; column 10, lines 27 - 47; column 11, lines 6 - 28; column 12,lines 8 - 18;column 15,lines 37 - 49 * * figures 1,5,20 *	1-17, 18-25	A 61 F 13/15 A 61 F 5/44
A	US-A-4 826 499 (N.A.AHR) * column 3, lines 19 - 29; column 5, lines 50 - 52; column 6, lines 31 - 35; column 7, lines 3 - 12 and 42 - 57; column 8, lines 3 - 7 and 58 - 61 * * figures 1-3 *	1-5,10-12	
A	EP-A-0 357 298 (PROCTER & GAMBLE) * column 5, lines 28 - 53 ; column 8, lines 18 - 27 * * figures 1-2 *	1-3,10-12	
A	US-A-4 795 510 (M.E.WITTROCK & P.T.HANDZIAK) * column 3, lines 22 - 23; column 3, line 51 column 4, line 5; column 4, line 59 column 5, line 15; column 5, lines 29 - 31; column 9, lines 60 - 68 * * figures 1-2 *	17-25	
A	EP-A-0 119 827 (PROCTER & GAMBLE) * page 16, line 20 - page 19, line 13 * * abstract; figure 13 *	18-25	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A 61 F

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	23 August 91	NICE P.R.

CATEGORY OF CITED DOCUMENTS

- X: particularly relevant if taken alone
- Y: particularly relevant if combined with another document of the same catagory
- A: technological background
- O: non-written disclosure
- P: intermediate document
- T: theory or principle underlying the invention
- E: earlier patent document, but published on, or after the filing date
- D: document cited in the application
- L: document cited for other reasons

&: member of the same patent family, corresponding document